

Application No.: 10/616,085
Amendment dated: January 11, 2006
Reply to Office Action of October 12, 2005

REMARKS/ARGUMENTS

Claims 19-24 were examined in the Office Action under reply, with claims 1-18 and 25 having been previously canceled. Claims 19-24 now stand rejected under 35 U.S.C. § 112, first paragraph, and under 35 U.S.C. § 103 over Konarski et al. (U.S. Patent No. 6,458,472), Charles et al. (U.S. Patent No. 6,528,169) and Sozansky et al. (U.S. Patent No. 5,953,814) in view of Japanese Patent No. 2001-139669 (previously referred to as "Inomata"). The present rejections are addressed in part by the present amendment and are otherwise traversed for reasons that will be discussed in detail below. With the present amendment, only claim 19 has been amended.

We appreciate the withdrawal of the rejections under 35 U.S.C. § 112, first and second paragraphs, and under 35 U.S.C. § 103 over Tuller et al. (U.S. Patent No. 4,042,550) and Lim (U.S. Patent No. 5,925,934) in view of Langari (U.S. Patent No. 6,261,871). We further acknowledge the previous withdrawal of the rejection under 35 U.S.C. § 103 over Inomata (JP 2001-139669) in view of Langari (U.S. Patent No. 6,261,871).

Amendments

The specification has been amended to correct the figures in Scheme 6. As the Examiner correctly points out, the styrene/maleic anhydride copolymer was inaccurately depicted. We thank the Examiner for noticing this obvious error. In addition, applicants correct another obvious error in Scheme 6. The figure of Bis F Epoxy has been corrected to delete the extraneous hydrogen attached to the oxygen in the left epoxy ring. One of skill in the art would clearly know that these figures were inaccurately depicted and would have known to interpret them as presently amended. As such, no new matter has been added.

Claim 19 has been amended to more clearly recite the claimed invention. Support for the styrene/maleic anhydride polymer having a molecular weight of about 1600 g/mole can be found, for example, in the specification at ¶¶ [022]-[026]. No new matter has been added.

Application No.: 10/616,085
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Claim Rejection Under 35 U.S.C. § 112, first paragraph

Claims 19-24 have been rejected under 35 U.S.C. § 112, first paragraph, as not complying with the written description requirement. According to the Examiner, (1) "There is no support on page 6, paragraph 11, the last three lines for the species of carboxylic acids for R of the maleic anhydride polymers comprising (bridged) cyclohexane in claim 27 [sic];" (2) "Page 5, the last line and page 8, Scheme 6 only enable styrene/maleic anhydride copolymers;" and (3) "The repeating unit for the styrene/maleic anhydride copolymer is inaccurately depicted."

While we agree that page 6, paragraph 11, does not list carboxylic acids for R in the given example, carboxylic acids were listed in the example provided in Scheme 3 on page 7 for maleic anhydride polymers comprising (bridged) cyclohexane in claim 19. As there is no claim 27, we assume that the Examiner was referring to claim 19. In addition, on page 6, paragraph [013], the specification states that R may be acids, which we assert would be understood by one of skill in the art to refer to carboxylic acids (-COOH), as shown in Scheme 3 on page 7. Thus, we assert that the carboxylic acid for R of the maleic anhydride polymers comprising (bridged) cyclohexane in claim 19 is supported by the specification.

With respect to the Examiner's concern over the claimed maleic anhydride polymers comprising styrene, we have amended claim 19 to address this concern. Thus, this aspect of the Examiner's rejection is obviated by the amendment.

With respect to the Examiner's third point, we have amended the specification to correct this obvious error. Again, we believe that one skilled in the art would recognize this error and would have interpreted it as currently amended.

In view of the foregoing, withdrawal of the Examiner's rejection/objection under § 112, first paragraph, is respectfully requested.

Claim Rejection Under 35 U.S.C. § 103(a)

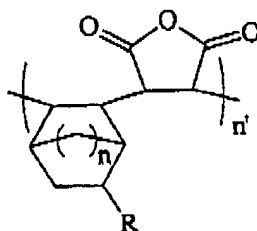
Claims 19-24 have been examined in the outstanding office action and currently stand rejected under 35 U.S.C. § 103(a) over Konarski et al. (U.S. Patent No. 6,458,472), Charles et al.

Application No.: 10/616,085
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(U.S. Patent No. 6,528,169) and Sozansky et al. (U.S. Patent No. 5,953,814) in view of Japanese Patent No. 2001-139669 (also known as "Inomata"). According to the Examiner, Konarski, Charles, and Sozansky disclose methods for fabricating a semiconductor device comprising electrically connecting integrated circuit chips to a substrate by reflowing the solder bumps and underfilling the gap between the chip and the substrate with a composition containing an epoxy resin and an anhydride curing agent and the Japanese patent discloses a semiconductor underfilling formulation comprising an epoxy resin and a norbornene-maleic anhydride copolymer as a curing agent.

Applicants assert that the present rejection does not cure the defects of the former Examiner's previous rejection of the claims over Inomata (JP 2001-139669) in view of Langari (U.S. Patent No. 6,261,871). According to that Examiner, Inomata disclosed the claimed resin composition and its use as an underfill composition, and Langari disclosed a method of fabricating a semiconductor device by the claimed steps and using an underfill composition therein. In response to this rejection, claim 19 was amended and the references were distinguished. In turn, the rejection was withdrawn.

As previously stated, as far as the machine translation of the Japanese patent is understood, it is respectfully submitted that it does not teach a curing agent as presently claimed. The present Examiner relies on the structure at paragraph [0046] of the Japanese patent. While Formula 8 comprises maleic anhydride, Formula 8 does not fall within the curing agent of currently amended claim 19. When the maleic anhydride polymer of claim 19 comprises norbornene (when $n = 1$), the polymer has the following structural formula:



Application No.: 10/616,085
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where n is 1, n' is 5 to 50, and R is selected from the group consisting of ethers, lactones, anhydrides, alcohols, nitriles, epoxy, carboxylic acids and mixtures thereof. The Japanese patent discloses a maleic anhydride polymer comprising norbornene where R is limited to an alkyl group, an aryl group, or $COOR_5$ wherein R_5 is an alkyl group or an aryl group. Thus, the Japanese patent does not disclose R as defined in currently amended claim 19.

Moreover, the claimed invention is distinguishable over the Japanese patent in the function of the present curing agents. As explained in ¶ [008] of the present specification, the known anhydrides "typically only perform one function, i.e. cross-linking." Greater cross-linking will result in a harder cured product. The invention of the Japanese patent is entitled "Hardener, Thermosetting Resin Composition and its Cured Product." Thus, like other known anhydrides, the anhydrides of the Japanese patent were used to improve cross-linking, thereby resulting in a harder cured product. The Japanese patent is unlike embodiments of the present invention in which the low molecular weight maleic anhydride polymers and oligomers are not only used to improve cross-linking, but can also be designed, i.e., by varying the R group, to modify viscosity, decrease moisture absorption, volatilization and modulus, improve mechanical properties, and/or enhance adhesion. See ¶ [009] of the present specification. The Japanese patent does not disclose or suggest that by modifying R any of these characteristics or properties can be affected. Therefore, it is respectfully submitted that there is no motivation to modify the teachings of the Japanese patent to arrive at the curing agent of the present invention.

As acknowledged by the Examiner, Konarski, Charles, and Sozansky do not teach the curing agent of amended claim 19. Therefore, their combination with the Japanese patent does not alleviate the deficiencies of the Japanese patent as discussed above. Therefore, it is respectfully submitted that the Examiner has failed to make a prima facie obviousness case. For all of the above reasons, applicants respectfully submit that the pending claims define an invention that is novel and nonobvious over the art. An indication of allowable subject matter would be much appreciated.

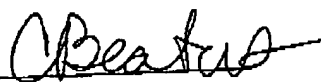
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The Examiner is invited to contact the undersigned at (408) 975-7500 to discuss any matter concerning this application. The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. §1.16 or §1.17 to Deposit Account No. 11-0600.

Respectfully submitted,

KENYON & KENYON

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